REMARKS/ARGUMENTS

Claims 1-3, 7-15, and 19-25 are pending in the present application. Claims 4-6 and 16-18 are canceled; and claims 1-3, 7-15, and 19-25 are amended. Support for the amendments to the claims is located at least in the previous drafts of the claims and in the specification on page 4, lines 1-17; on page 7, lines 11-26; on page 8, lines 3-11; on page 9, lines 5-13; on page 10, lines 1-9 and 18-24; on page 22, line 22, through page 23, line 27; on page 24, line 12, through page 26, line 21; and in Figures 4A-4F, 5, 6, and 7. Reconsideration of the claims is respectfully requested.

I.   35 U.S.C. § 101 (Claims 1-3 and 7-12)

The Examiner has rejected claims 1-3 and 7-12 under 35 U.S.C. § 101 as being directed towards non-statutory subject matter. This rejection is respectfully traversed.

The Examiner states:

> In order for a method to be considered a "process" under § 101, a claimed process must either: (1) be tied to another statutory class (such as a particular apparatus) or (2) transform underlying subject matter (such as an article or materials). *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972). If neither of these requirements is met by the claim, the method is not a patent eligible process under § 101 and is non-statutory subject matter.

Office Action dated December 26, 2008, page 2.

Claim 1 is amended to overcome this rejection. Therefore, Applicant respectfully requests withdrawal of the rejection of claims 1-3 and 7-12 under 35 U.S.C. § 101.

II.   35 U.S.C. § 112, First Paragraph (Claim 25)

The Examiner has objected to the specification under 35 U.S.C. § 112, first paragraph, as failing to adequately teach how to make and/or use the invention in claim 25. Additionally, the Examiner rejected the claims under the same reasons. This rejection is respectfully traversed.

The Examiner states:

> The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 25 uses "means for" language in conjunction with an apparatus.

In the specification there is no support, in the form of an algorithm, to enable one in the art to recreate the invention.

Office Action dated December 26, 2008, page 3.

Claim 25 is amended to overcome this rejection. Therefore, Applicant respectfully requests withdrawal of the objection of the specification under 35 U.S.C. § 112, first paragraph.

III.   35 U.S.C. § 112, Second Paragraph (Claims 1-3, 7-15 and 19-25)

The Examiner has rejected claims 1-3, 7-15 and 19-25 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter, which applicant regards as the invention. This rejection is respectfully traversed.

The Examiner states:

> See MPEP § 2172.01. The omitted elements are: In the independent claims it is unclear if the updated data modifies the historical or if the updated data replaces the historical data and the method simply repeats what was done to the historical data. Examiner is reviewing the claims as if the updated data completely replaces the historical data.

Office Action dated December 26, 2008, page 3.

Claims 1, 13 and 25 are amended to overcome this rejection. Therefore, Applicant respectfully requests withdrawal of the rejection of claims 1-3, 7-15, and 19-25 under 35 U.S.C. § 112, second paragraph.

IV.   Objection to Claims (Claims 13-24)

The Examiner has stated that claims 13-24 were objected to due to the following informalities:

> Examiner notes the applicant is attempting to claim a computer product on a computer readable medium, but believes the language used in the claims read more as computer code per se. Applicant should consult Patent 5,710,578 claim 10 for guidance on how to properly claim a computer product on computer readable medium. Examiner specifically would like to point out that the "instructions" prior to each paragraph reads like computer code.
> Appropriate correction is required.

Office Action dated December 26, 2008, page 2.

In response, claim 13 is amended to overcome this objection.

V. 35 U.S.C. § 103, Obviousness (Claims 1-3, 7-9, 13-15, 19-21 and 25)

The Examiner has rejected claims 1-3, 7-9, 13-15, 19-21, and 25 under 35 U.S.C. § 103 as being unpatentable over *Yamanishi et al.*, U.S. Patent No. 7,353,214 (hereinafter "*Yam*") in view of *Yamanishi et al.*, U.S. Patent No. 7,333,923 (hereinafter "*Yamanishi*"). This rejection is respectfully traversed.

With respect to the independent claims, the Examiner states:

Regarding Claims 1, 13, and 25.
Yam teaches:
receiving a set of historical data; (See Col 1 Lines 21-29)
identifying a plurality of control points in the historical data, further comprising:
identifying a plurality of outliers in a distribution of the historical data; (See Col. 2 Lines 38-48)
validating the plurality of outliers to distinguish between a first set of outliers and a second set of outliers, wherein the first set of outliers are classified as valid outliers and the second set of outliers are classified as invalid outliers, and wherein the first set of outliers are identified as the plurality of control points; (See Col. 2 Lines 38-48)
building at least one data model based on the plurality of control points, further comprising:
generating a fence that passes through the plurality of control points to define a boundary between data points, wherein data points within the fence represent acceptable behavior and data points outside the fence represent fraudulent behavior;
receiving a set of updated data;
identifying one or more new control points based on the updated data, further comprising:
identifying an additional plurality of outliers in a distribution of the updated data; and
validating the additional plurality of outliers to distinguish between a third set of outliers and a fourth set of outliers, wherein the third set of outliers are classified as valid outliers and the fourth set of outliers are classified as invalid outliers, and wherein the third set of outliers are identified as the one or more new control points;
adjusting the at least one data model to form an adjusted data model, within the at least one data model, based on the one or more new control points, wherein the at least one data model is refined for a plurality of iterations; and (Col. 2-3 Lines 61-27)
Yam fails to teach verifying a transaction based on the adjusted data model.
Yamanishi teaches verifying a transaction based on the adjusted data model. (See Col. 1 Lines 18-25)

It would be obvious to one skilled in the art at the time of the invention to combine Yam and Yamanishi to utilize the verification of Yamanishi in Yam to provide a user to use fraud detection in verifying transaction are legitimate or not. It is within the capabilities of one of ordinary skill in the art to implement the verification of Yamanishi in Yam.

Examiner notes that the "fence" (the number given for determining a valid or invalid outlier) passes through a plurality of control points.

Office Action dated December 26, 2008, pages 4-6.

As amended, claim 1, which is representative of the other rejected independent claims 13 and 25 with regard to similarly recited subject matter, reads as follows:

1.   A computer implemented method, in a data processing system, for detecting fraud, the computer implemented method comprising:

a plurality of steps performed by a processor in the data processing system, the plurality of steps comprising:

receiving a set of historical data stored in a customer behavior database;

identifying a plurality of control points in the set of historical data using a data analysis module, further comprising:

identifying a plurality of outliers in a distribution of the set of historical data; and

validating the plurality of outliers to distinguish between a first set of outliers and a second set of outliers, wherein *the first set of outliers are classified as valid outliers* and the second set of outliers are classified as invalid outliers, and wherein *the first set of outliers are identified as the plurality of control points*;

building at least one data model based on the plurality of control points, further comprising:

generating a fence that passes through the plurality of control points to define a boundary between data points, wherein the fence comprises line segments connecting the plurality of control points to form a continuous line for the boundary, and wherein data points inside the boundary of the fence represent acceptable behavior and data points outside the boundary of the fence represent fraudulent behavior;

receiving a set of updated data, wherein the set of updated data includes a plurality of current data from the customer behavior database;

identifying one or more new control points based on the set of updated data using the data analysis module, further comprising:

identifying an additional plurality of outliers in a distribution of the set of updated data; and

validating the additional plurality of outliers to distinguish between a third set of outliers and a fourth set of outliers, wherein *the third set of outliers are classified as valid outliers* and the fourth set of outliers are classified as invalid outliers, and wherein *the third set of outliers are identified as the one or more new control points*;

adjusting the at least one data model to form an adjusted fence, within the at least one data model, *based on the one or more new control points*, wherein the at least one data model is refined for a plurality of iterations, further comprising:

generating the adjusted fence that passes through the plurality of control points and the one or more new control points to define a new boundary between data points, wherein the adjusted fence comprises line segments connecting the plurality of control points and the one or more new control points to form a new continuous line for the new boundary, and wherein data points inside the new boundary of the adjusted fence represent acceptable behavior and data points outside the new boundary of the adjusted fence represent fraudulent behavior; and
verifying a transaction based on the adjusted fence. (emphasis added)

The Examiner bears the burden of establishing a *prima facie* case of obviousness based on prior art when rejecting claims under 35 U.S.C. § 103. *In re Fritch*, 972 F.2d 1260, 23 U.S.P.Q.2d 1780 (Fed. Cir. 1992). The prior art reference (or references when combined) must teach or suggest all the claim limitations. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). In determining obviousness, the scope and content of the prior art are… determined; differences between the prior art and the claims at issue are… ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background the obviousness or non-obviousness of the subject matter is determined. *Graham v. John Deere Co.*, 383 U.S. 1 (1966). "Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue." *KSR Int'l. Co. v. Teleflex, Inc.*, No. 04-1350 (U.S. Apr. 30, 2007). *"Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.* Id. (citing *In re Kahn*, 441 F.3d 977, 988 (CA Fed. 2006))."

Yam and Yamanishi do not teach or suggest all of the limitations of amended independent claims 1, 13, and 25. Therefore, a *prima facie* case of obviousness has not been established based on prior art when rejecting these claims.

In the claims of the patent application, a fence is generated that passes through a plurality of control points, which are valid outliers identified in a distribution of a set of historical data from a customer behavior database, to define a boundary between data points. This fence is a continuous line comprising line segments connecting the plurality of control points to define the boundary between data points. Data points inside the boundary of the fence represent acceptable behavior and data points outside the boundary of the fence represent fraudulent behavior. New control points are identified in a distribution of a set of updated data. The new control points are valid outliers identified in a distribution of a set of updated data that includes current data from the customer behavior database. An adjusted fence is generated that passes through the plurality of control point <u>and</u> the new control points. The adjusted fence is a new continuous line comprising line segments connecting the plurality of control point and the new control points to define a new boundary between data points. A transaction is verified based on the adjusted fence and data points for the transaction. Data points inside the new boundary of the adjusted fence represent acceptable behavior and data points outside the new boundary of the adjusted fence represent fraudulent behavior. *Yam* and *Yamanishi*, taken alone or in combination, do not teach or suggest these features.

Yam is cited for allegedly teaching all of the features of the independent claims except for the verifying step. The Office Action refers to the following portions of *Yam* in the rejection of independent claims 1, 13, and 25:

> Among well-known systems based on supervised learning are that proposed by T. Fawcett and F. Provost ("Combining Data Mining and Machine Learning for Effective Fraud Detection", Proceedings of AI Approaches to Fraud Detection and Risk Management, pp. 14-19, 1997) and that proposed by J. Ryan, M. Lin and R. Miikkulainen ("Intrusion Detection with Neural Networks", Proceedings of AI Approaches to Fraud Detection and Risk Management, pp. 72-77, 1997).

Yam, column 1, lines 21-29.

> In the preferred construction, the outlier rule generation device may comprise a degree of outlier calculation unit for calculating a degree of outlier indicative of a degree of being abnormal with respect to each data in the data set, a sampling unit for sampling each the data based on the degree of outlier calculated to apply a label indicating whether data is abnormal data or not to the sampled data, and a supervised learning unit for generating a rule characterizing

abnormal data by supervised learning based on a set of the respective data to which the label is applied.

Yam, column 2, lines 38-48.

In the preferred construction, the outlier detection device may comprise an outlier rule preservation unit for holding the set of rules characterizing abnormal data, a filtering unit for determining whether each data of the data set is abnormal data or not based on the held rules, a degree of outlier calculation unit for calculating a degree of outlier indicative of a degree of being abnormal with respect to each data determined not to be abnormal data by the filtering unit, a sampling unit for sampling each data whose degree of outlier is calculated by the degree of outlier calculation unit based on the degree of outlier calculated to apply a label indicating whether data is abnormal data or not to the sampled data, and a supervised learning unit for generating a new rule characterizing abnormal data by supervised learning based on a set of the respective data to which the label is applied and adding the new rule to the held set of rules to update the rules.

In another preferred construction, after repeatedly executing a predetermined number of times a series of processing of making determination of abnormal data in the data set based on the held rules, generating a new rule characterizing abnormal data based on each the data determined not to be abnormal and updating the held rules,

determination is made whether each data of the data set is abnormal data or not based on the held rules to output the determination result.

In another preferred construction, a series of processing of making determination of abnormal data in the data set based on the held rules, outputting data determined to be abnormal, generating a new rule characterizing abnormal data based on each the data determined not to be abnormal and updating the held rules is repeatedly executed a predetermined number of times with respect only to data determined not to be abnormal in preceding processing.

Yam, column 2, line 61, through column 3 line 27.

In these portions, *Yam* discloses preferred constructions for *Yam's* invention. *Yam's* outlier rule generation device discloses an outlier rule preservation unit, a filtering unit, a degree of outlier calculation unit, a sampling unit, and a supervised learning unit. The outlier rule preservation unit holds the set of rules characterizing abnormal data. The filtering unit determines whether each data of the data set is abnormal data or not based on the held rules. The degree of outlier calculation unit calculates a degree of outlier indicative of a degree of being abnormal with respect to each data in the data set. The sampling unit samples each the data based on the degree of outlier calculated to apply a label indicating whether data is abnormal data or not to the sampled data. The supervised learning unit generates a rule characterizing abnormal data by supervised learning based on a set of the respective data to which the label is

applied. *Yam* does not identify a first set of outliers that are classified as valid outliers as the plurality of control points. *Yam* does not teach or suggest building at least one data model based on this identified plurality of control points. To the contrary, *Yam* discloses labeling data as abnormal or normal based on *rules*. *Yam* does not teach or suggest a fence or generating a fence that passes through the plurality of control points to define a boundary between data points. *Yam* does not teach or suggest that this fence comprises line segments connecting the plurality of control points to form a continuous line for the boundary and that data points inside the boundary of the fence represent acceptable behavior and data points outside the fence represent fraudulent behavior. Therefore, *Yam* does not teach or suggest the following limitation as recited in amended independent claims 1, 13, and 25:

> building at least one data model based on the plurality of control points,
> further comprising:
>> generating a fence that passes through the plurality of control points to define a boundary between data points, wherein the fence comprises line segments connecting the plurality of control points to form a continuous line for the boundary, and wherein data points inside the boundary of the fence represent acceptable behavior and data points outside the boundary of the fence represent fraudulent behavior;

Similarly, *Yam* does not teach or suggest adjusting the at least one data model to form an adjusted fence based on the one or more new control points. *Yam* discloses labeling data as abnormal or normal based on rules rather than identifying a third set of outliers that are classified valid outliers as the one or more new control points. The one or more new control points were identified in a distribution of a set of updated data that includes current data from the customer behavior database. *Yam* does not teach or suggest an adjusted fence or generating an adjusted fence that passes through the plurality of control points and the one or more new control points to define a new boundary between data points. *Yam* does not teach or suggest that this adjusted fence comprises line segments connecting the plurality of control points and the one or more new control points to form a new continuous line for the new boundary and that data points inside the boundary of the fence represent acceptable behavior and data points outside the fence represent fraudulent behavior. Therefore, *Yam* does not teach or suggest the following limitation as recited in amended independent claims 1, 13, and 25:

> adjusting the at least one data model to form an adjusted fence, within the at least one data model, based on the one or more new control points, wherein the at least one data model is refined for a plurality of iterations, further comprising:

generating the adjusted fence that passes through the plurality of control points and the one or more new control points to define a new boundary between data points, wherein the adjusted fence comprises line segments connecting the plurality of control points and the one or more new control points to form a new line for the new boundary, and wherein data points within the adjusted fence represent acceptable behavior and data points outside the adjusted fence represent fraudulent behavior;

Further, *Yamanishi* does not provide for the deficiencies of *Yam*. Thus, *Yam* and *Yamanishi*, taken alone or in combination, do not teach or suggest these features.

The Office Action refers to the following portion of *Yamanishi* in the rejection of the verifying step of independent claims 1, 13, and 25:

Such a degree of outlier calculation device is for use in finding an abnormal value or an outlier which largely deviates from data patterns obtained so far from multi-dimensional time series data and is employed, for example, in a case of finding such fraud behavior as so-called cloning use from a record of cellular phone services and in a case of finding abnormal transaction from a use history of a credit card.

Yamanishi, column 1, lines 18-25.

This portion of *Yamanishi* states that <u>a degree of outlier calculation device</u> is used in finding an abnormal value or an outlier which largely deviates from data patterns obtained so far from multi-dimensional time series data. The degree of outlier calculation device is employed to find fraudulent or abnormal transactions. The degree of outlier calculation device is not an adjusted fence. *Yamanishi* does not teach or suggest "verifying a transaction based on the adjusted fence," as recited in amended claims 1, 13, and 25.

Further, *Yam* does not provide for the deficiencies of *Yamanishi*. Thus, *Yam* and *Yamanishi*, taken alone or in combination, do not teach or suggest these features.

In view of the above, the Examiner has not established a *prima facie* case of obviousness based on the prior art when rejecting amended independent claims 1, 13, and 25. Thus, Applicant respectfully requests withdrawal of the rejection of independent claims 1, 13, and 25 under 35 U.S.C. § 103(a). Additionally, *Yam* and *Yamanishi*, taken alone or in combination, do not teach or suggest the features of dependent claims 2-3, 7-9, 14-15, and 19-21 at least by virtue

of their dependency on independent claims 1, 13, and 25. Therefore, Applicant respectfully requests withdrawal of the rejection of dependent claims 2-3, 7-9, 14-15, and 19-21 under 35 U.S.C. § 103(a).

In addition to being dependent on their respective independent claims 1 and 13, amended claims 8-9 and 20-21 also distinguish over the *Yam* and *Yamanishi* references based on the specific features recited therein. With respect to amended claims 8 and 20, *Yam* and *Yamanishi*, taken alone or in combination, do not teach or suggest "adding the one or more new control points to the adjusted fence." Neither *Yam* nor *Yamanishi* mention this feature.

In addition, *Yam* and *Yamanishi*, taken alone or in combination, do not teach or suggest "changing one or more of the plurality of control points to the one or more new control points in the adjusted fence," as recited in claims 9 and 21. One or more of the plurality of control points used to generate the adjusted fence are changed to one or more of the new control points. In other words, one or more of the original control points in the plurality of control points may be change to (or replaced by) one or more of the new control points when generating an adjusted fence. Neither *Yam* nor *Yamanishi* mention this feature.

VI.   35 U.S.C. § 103, Obviousness (Claims 10-12 and 22-24)

The Examiner has rejected claims 10-12 and 22-24 under 35 U.S.C. § 103 as being unpatentable over *Yam* in view of *Yamanishi*, in further view of *Piche et al.*, U.S. Patent No. 6,047,221 (hereinafter "*Piche*"). This rejection is respectfully traversed.

Since claims 10-12 and 22-24 depend from independent claims 1 and 13, respectively, the same distinctions between *Yam*, *Yamanishi*, and the invention recited in claims 1 and 13 applies to dependent claims 10-12 and 22-24. Thus, the Examiner has failed to state a *prima facie* obviousness rejection against dependent claims 10-12 and 22-24 at least by virtue of their dependency on claims 1 and 13, respectively. Accordingly, Applicant respectfully requests withdrawal of the rejection of claim 10-12 and 22-24 under 35 U.S.C. § 103(a).

VII. Conclusion

It is respectfully urged that the subject application is patentable over the cited references and is now in condition for allowance.

The Examiner is invited to call the undersigned at the below-listed telephone number if in the opinion of the Examiner such a telephone conference would expedite or aid the prosecution and examination of this application.

DATE: <u>March 26, 2009</u>

Respectfully submitted,

<u>/Rudolf O. Siegesmund/</u>

Rudolf O. Siegesmund
Reg. No. 37,720
Yee & Associates, P.C.
P.O. Box 802333
Dallas, TX 75380
(972) 385-8777
Attorney for Applicant

ROS/VJA